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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/624,593	07/23/2003	Kei Hayasaki	04329.3100	7500

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EXAMINER

BARRECA, NICOLE M

ART UNIT	PAPER NUMBER
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1756

DATE MAILED: 09/28/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/624,593

Applicant(s)

HAYASAKI ET AL.

Examiner

Nicole M. Barreca

Art Unit

1756

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 13 July 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-125 is/are pending in the application.
- 4a) Of the above claim(s) 49-125 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-48 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 7/23/03; 1/10/05
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

1. Applicant's election without traverse of Group I, claims 1-48 in the reply filed on 7/13/05 is acknowledged.
2. Claims 49-125 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected inventions, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on 7/13/05.

Priority

3. Applicant cannot rely upon the foreign priority papers to overcome any of the following rejections including an intervening reference because a translation of said papers has not been made of record in accordance with 37 CFR 1.55. See MPEP § 201.15.

Claim Objections

4. Applicant is advised that should claims 33-40 be found allowable, claims 41-48 will be objected to under 37 CFR 1.75 as being a substantial duplicate thereof. When two claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k).

Claim Rejections - 35 USC § 112

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Art Unit: 1756

6. Claims 21-32 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 21 does not recite forming a pattern. It is therefore unclear what pattern is contacted with the activated water and what pattern is removed with the developing solution. Is it an exposed latent image pattern or a developed pattern?

Since the claim is written in open language and the language of its process steps are unclear, the steps of development and contact with activated water have been interpreted by the examiner as being able to occur in any sequential order.

Claim Rejections - 35 USC § 102

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

8. Claims 1 and 21 are rejected under 35 U.S.C. 102(b) as being anticipated by Kosa (US 2001/0018168).

9. Resist 11 is applied to the wafer substrate 10, exposed in a pattern and developed. A resist mixture 14 containing dissolved resist 13 and alkaline developer 15

Art Unit: 1756

remains. Ozone water 16 is dropped on the resist 11 to wash away the resist mixture 14 (slimming). See [0022]-[0023], [0032].

10. Claims 1, 3-5, 7, 21, 23-25, and 27 are rejected under 35 U.S.C. 102(b) as being anticipated by Ema (US 6,372,413).

11. A photoresist is formed on substrate 11, exposed through a mask and developed. The substrate was then subjected to a rinsing process in which deionized water containing 3-ppm ozone gas was applied, thereby oxidizing and decomposing resist residues 14A. See col.3, 9-50. Ozone water is produced by supplying deionized water containing oxygen to a light irradiation unit emitting VUV light of 172 nm. See col.7, 34-45.

12. Claims 21, 33, 41 are rejected under 35 U.S.C. 102(e) as being anticipated by Takahashi (US 6, 818,387)

The applied reference has a common inventor with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 102(e) might be overcome either by a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not the invention "by another," or by an appropriate showing under 37 CFR 1.131.

13. A resist is coated on substrate 100, exposed through a mask and PEB. An aqueous solution of ozone is applied to the substrate surface, followed by exposure to a developing solution. See col.5, 38-67.

Art Unit: 1756

14. Claims 1, 2, 21 and 22 are rejected under 35 U.S.C. 102(e) as being anticipated by Hayasaki (US 2004/0029026)

The applied reference has a common inventor with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 102(e) might be overcome either by a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not the invention "by another," or by an appropriate showing under 37 CFR 1.131.

15. A resist is coated on substrate 300, exposed through a mask and PEB and developed. Ozone water is then discharged. A second cleaning treatment may be applied. Other cleaning solutions may also be used such as ozone water, oxygen water, ion water, supercritical water, carbonated water, hydrogen water and pure water. The cleaning treatment causes dissolution proceeding in the depth direction (slimming). See [0201]-[0204], [0220], [0229], cl.24-26.

Claim Rejections - 35 USC § 103

16. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

17. Claims 8 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kosa or Ema or Hayasaki.

18. The references teach using ozone water as the activated water but are silent on

Art Unit: 1756

the amount of the pattern surface which is removed or oxidized and do not disclose that this is 5 nm or more. However the amount of oxidization would be result effective variables dependent on the specific conditions of the process, such as amount of ozone and time of contact. It would within the ordinary skill of one in the art to determine the optimal pattern surface oxidized in the method of Kosa or Ema or Hayasaki by routine experimentation and to have this be 5 nm or more, if required, because amount of removal or oxidization is a result-effective variable and the discovery of an optimum value of a result effective variable is ordinary within the skill of the art, as taught by *In re Boesch*, (617 F.2d 272, 205 USPQ 215 (CCPA 1980)).

19. Claims 28, 40 and 48 are rejected under 35 U.S.C. 103(a) as being obvious over Takahashi.

20. The references teach using ozone water as the activated water but are silent on the amount of the pattern surface which is removed or oxidized and do not disclose that this is 5 nm or more. However the amount of oxidization would be result effective variables dependent on the specific conditions of the process, such as amount of ozone and time of contact. It would within the ordinary skill of one in the art to determine the optimal pattern surface oxidized in the method of Takahashi by routine experimentation and to have this be 5 nm or more, if required, because amount of removal or oxidization is a result-effective variable and the discovery of an optimum value of a result effective variable is ordinary within the skill of the art, as taught by *In re Boesch*, (617 F.2d 272, 205 USPQ 215 (CCPA 1980)).

Art Unit: 1756

21. Claims 9-18 and 29-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kosa or Ema or Hayasaki as applied to claims 1 or 21 above, and further in view of Ito (US 2003/0219660).

22. The references do not disclose measuring the pattern dimension by emitting light. Ito teaches a method capable of performing CD slimming with a sufficient tolerance and capable of forming a pattern with a line width of 70 nm or less. Prior to a slimming process, a to be slimmed region of the resist pattern is detected using an optical apparatus with applying light. The energy of a probe was employed as a size-measuring instrument. It would have been obvious to one of ordinary skill in the art to measure the resist pattern by emitting light because Ito teaches that using this method a pattern with a line width of 70 nm or less can be formed and CD slimming with a sufficient tolerance can be achieved. While the reference does not explicitly disclose repeating the measurement and slimming process, it would have been obvious to one of ordinary skill in the art that the process would be repeated until the desired resist pattern was achieved. [0008]-[0011], [0030]-[0041], [0088].

23. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ema as applied to claim 5 above, and further in view of Yokoi (US 2005/0176259).

24. Ema dissolves ozone in the activated water with light and does not disclose using hydrogen peroxide. Yokoi teaches dissolving photoresist using either ozone water or an aqueous hydrogen peroxide [0034]-[0035]. It would have been obvious to one of ordinary skill in the art to use hydrogen peroxide instead of ozone for the activated

Art Unit: 1756

water method of Ema because Yokoi teaches that either solution are effective for dissolving photoresist.

25. Claims 19-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kosa or Ema or Hayasaki as applied to claim 1 above, and further in view of Namatsu (US 6,358,673).

26. The references do not dissolve drying the substrate using supercritical carbon dioxide. Namatsu teaches a method for forming a resist pattern without pattern bending or swelling. After development the resist pattern layer is exposed to a rinse solution. In order to suppress the entrance of moisture into the resist pattern, the pattern is exposed to supercritical carbon dioxide fluid. The supercritical fluid is vaporized by lowering the ambient pressure. See col.3, 48-col.4, 59. It would have been obvious to one of ordinary skill in the art to expose the resist patterns to supercritical carbon dioxide because Namatsu teaches that using this method will form resist patterns without bending or swelling.

27. Claims 34 and 42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takakashi as applied to claims 33 or 41 above, and further in view of Hayasaki.

28. Takakashi uses ozone water as the activated water and does not disclose using supercritical water. Hayasaki teaches that ozone water, oxygen water, ion water, supercritical water, carbonated water, hydrogen water and pure water may all be used as cleaning solutions for resist patterns. It would have been obvious to one of ordinary skill in the art to use supercritical water instead of ozone water in the method of

Art Unit: 1756

Takakashi because Hayasaki teaches that both are suitable cleaning solutions for resist patterns.

29. Claims 35-39 and 43-47 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takakashi as applied to claims 33 or 41 above, and further in view of Ema (US 6,372,413).

30. Takakashi is silent on how the ozone water is produced and does not disclose irradiating the water with light. Ema teaches that ozone water is produced by supplying deionized water containing oxygen to a light irradiation unit emitting VUV light of 172 nm. It would have been obvious to one of ordinary skill in the art to produce the ozone water in the method of Takakashi by supplying deionized water containing oxygen to a light irradiation unit emitting VUV light of 172 nm because Ema teaches that this is a known method for producing ozone water.

31. The applied references (Takahashi, Hayasaki, Ito) have a common inventor with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art only under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 103(a) might be overcome by: (1) a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not an invention "by another"; (2) a showing of a date of invention for the claimed subject matter of the application which corresponds to subject matter disclosed but not claimed in the reference, prior to the effective U.S. filing date of the reference under 37 CFR 1.131; or (3) an oath or declaration under 37 CFR 1.130 stating that the application and reference are currently owned by the same party and

Art Unit: 1756

that the inventor named in the application is the prior inventor under 35 U.S.C. 104, together with a terminal disclaimer in accordance with 37 CFR 1.321(c). This rejection might also be overcome by showing that the reference is disqualified under 35 U.S.C. 103(c) as prior art in a rejection under 35 U.S.C. 103(a). See MPEP § 706.02(I)(1) and § 706.02(I)(2).

Conclusion

32. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nicole M. Barreca whose telephone number is 571-272-1379. The examiner can normally be reached on Monday-Thursday (9AM-7PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark F. Huff can be reached on 571-272-1385. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Nicole M Barreca
Primary Examiner
Art Unit 1756



9/22/05